

Introduction

The Linac Coherent Light Source, LCLS, at the SLAC National Accelerator Laboratory, SNAL, is the first hard x-ray Free Electron Laser. The Undulator Controls Module, UCM, controls five cams and two translation stages that regulate the position of each of the 33 permanent undulator magnet segments within 10 microns. The UCM package, hardware and software, was designed and built by the Advanced Photon Source at Argonne. The UCM is still evolving, and many improvements can still be made to provide a more user friendly and stable control system. A functional diagram of the current system, from the perspective of the user, is shown below.

UCM Global Controls: A control panel with buttons for 'STOP ALL MOTORS' and 'Select ALL' for 33 undulators (Undulator 1 to 33).

Position Summary Legend: A help window explaining the status of undulator segments, such as 'Undulator not installed' (grey) or 'Undulator installed, stages relative position shown by the bar within the rectangle'.

RTD Temperature Monitors: A table showing temperatures for 33 undulators (Und-01 to Und-33) across various points (T01 to T12).

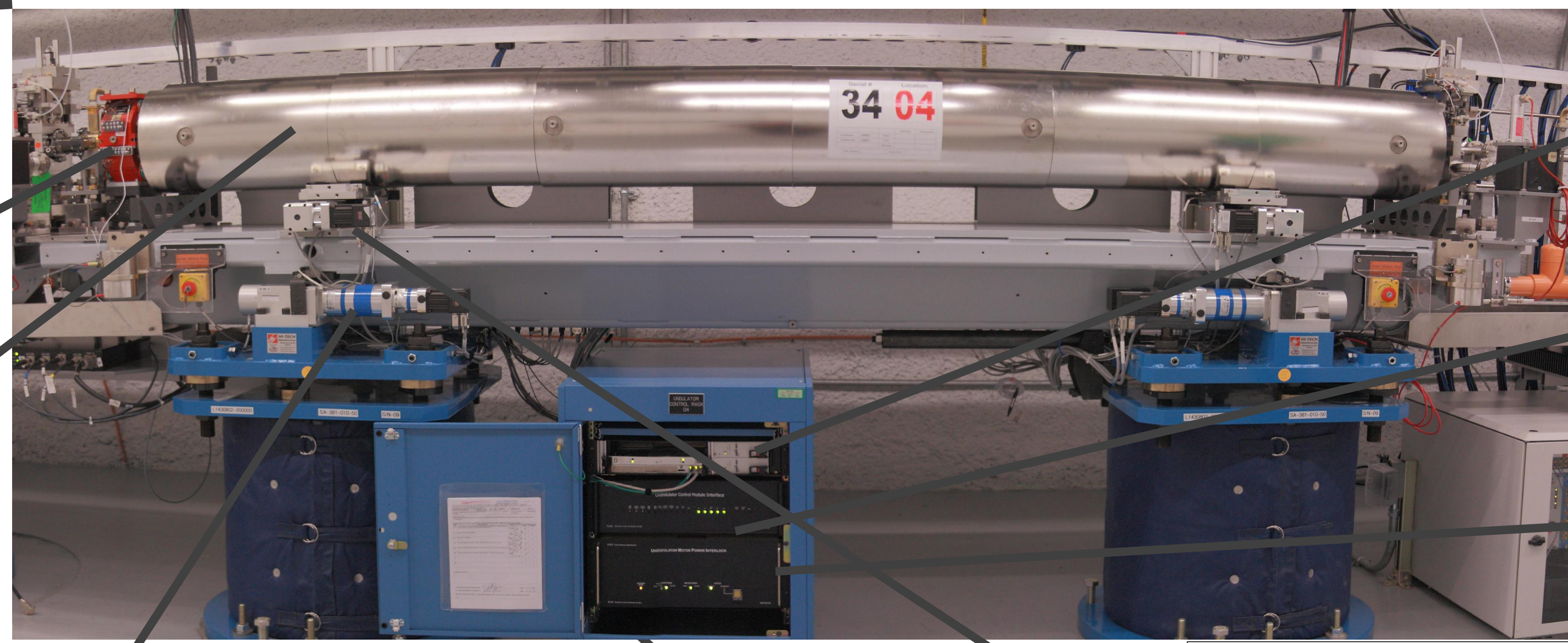
Selected functions are available from the Global Controls to control all or a selection of undulator segments.

LCLS Subsystems and Areas: Und. Collimators and Motion Control: A dashboard showing the status of various undulator segments (Undulator 1 to 33) with green and red indicators.

Alarm summaries, undulator position summaries, and links to individual segment controls, also Global Controls, and Global Statuses can be found from this page.

TM Motor Position vs Linear Rot ReadBack: A table comparing motor position and linear readback for 33 undulators (Und-01 to Und-33).

Examples of global status pages, with status for selected readbacks, for all 33 undulators.



VME crate containing a Motorola MVME 3100 CPU running RTEMS 4.9.1, and EPICS 3.14.10, an Industry Pack carrier with an ADC, an RS232 communication card for the smart motors, and a digital input/output card.

Undulator Control Module Interface, UCMI, built to interface individual devices with the EPICS controls system, Input Output Controller and provide interlocks.

Undulator Motor Power Interface, UMPI, built to house interlocked power supplies.

USEG:UND1:450 CAM Motor Records: A page showing records for five CAM motors (CAM 1 to CAM 5) with fields for position and status.

USEG:UND1:450 CAM Motion: A page for controlling CAM motion with fields for upstream and downstream positions.

USEG:UND1:450 Translation Motor: A page for controlling translation motors with fields for relative and absolute positions.

USEG:UND1:450 Undulator: A controls page for an individual undulator segment, showing BFW and QUAD actuator settings.

USEG:UND1:450 Alternate Motion: A page for alternate motion control with fields for upstream and downstream positions.

USEG:UND1:450 Undulator field: A page for undulator field calculations, showing equations for K vs X, IX vs X, and IY vs X.

USEG:UND1:450 Translation Motors: A page for controlling translation motors with fields for motor readback and status.

USEG:UND1:450 Skew level2 recovery instructions: A page providing detailed instructions for recovering from a skew level 2 error.

USEG:UND1:450 Undulator fields calculations page: A page for undulator field calculations, showing equations for K vs X, IX vs X, and IY vs X.

USEG:UND1:450 RTDs: A page for RTD data acquisition, showing a table of RTD data and correction coefficients.

USEG:UND1:450 Undulator fields temperature correction page: A page for undulator fields temperature correction, showing a table of correction data.

Undulator translation motors page.

Skew interlock recovery instructions.

Undulator fields temperature correction page.

Skew interlock recovery instructions.